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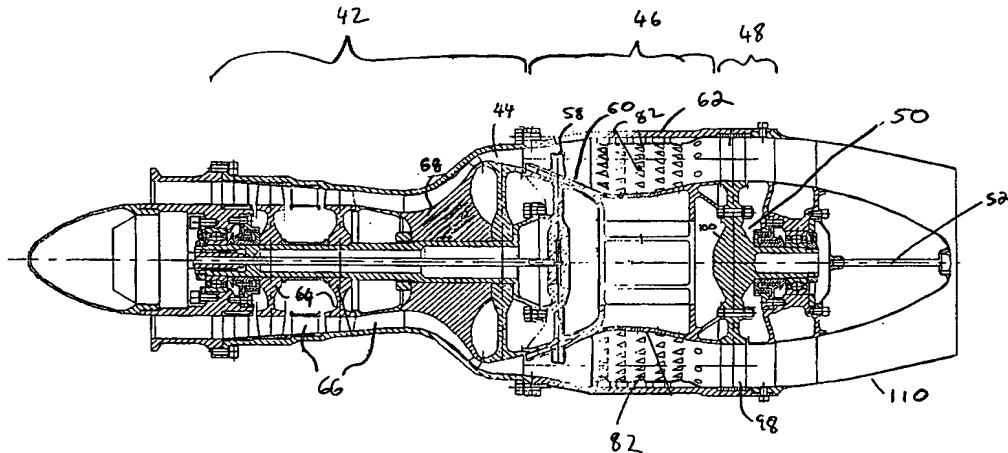
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For two-letter codes and other abbreviations, refer to the "Guid-
ance Notes on Codes and Abbreviations" appearing at the begin-
ning of each regular issue of the PCT Gazette.

(54) Title: ORBITING COMBUSTION NOZZLE ENGINE



(57) Abstract: An orbiting combustor nozzle (OCN) engine, having a rotating assembly comprising a co-rotating compressor and nozzle wheel enclosed within a non-rotating outer casing, defining a rotating combustion chamber, is disclosed. Combustion occurs in the combustion chamber in a vortex of gas that rotates at the same angular velocity as the rotating assembly. Also disclosed, is a method of cooling a blade of a rotating wheel, such as a turbine wheel or nozzle wheel, by projecting cool air at the base of the vane from a nozzle corotating with the blade. Such cooling is easily implemented in an OCN engine with use of an innovative annular combustor. Also disclosed is a method of countering axial backflow by use of a combustion chamber compressor.

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 1133/4	FOR FURTHER ACTION	see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.
International application No. PCT/IL03/00434	International filing date (<i>day/month/year</i>) 26 May 2003 (26.05.2003)	(Earliest) Priority Date (<i>day/month/year</i>) 26 June 2002 (26.06.2002)
Applicant R-JET ENGINEERING LTD.		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 4 sheets.



It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the Report

- a. With regard to the language, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.



the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international search was carried out on the basis of the sequence listing:



contained in the international application in written form.



filed together with the international application in computer readable form.



furnished subsequently to this Authority in written form.



furnished subsequently to this Authority in computer readable form.



the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.



the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

2. ☐ Certain claims were found unsearchable (See Box I).

3. ☒ Unity of invention is lacking (See Box II).

4. With regard to the title,



the text is approved as submitted by the applicant.



the text has been established by this Authority to read as follows:

5. With regard to the abstract,



the text is approved as submitted by the applicant.



the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the drawings to be published with the abstract is Figure No. 2



as suggested by the applicant.



None of the figures



because the applicant failed to suggest a figure.



because this figure better characterizes the invention.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/IL03/00434

Box I Observations where certain claims were found unsearchable (Continuation of Item 1 of first sheet)

This international report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claim Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claim Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claim Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of Item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:
Please See Continuation Sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐
☒

- The additional search fees were accompanied by the applicant's protest.
No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/IL03/00434

A. CLASSIFICATION OF SUBJECT MATTER IPC(7) : F02C 3/14, 3/34, 7/18 US CL : 60/39.34, 39.35, 750, 806 According to International Patent Classification (IPC) or to both national classification and IPC				
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) U.S. : 60/39.34, 39.35, 750, 806 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)				
C. DOCUMENTS CONSIDERED TO BE RELEVANT				
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.		
X	US 4,345,426 A (EGNELL et al) 24 August 1982, see entire document	14		
X	US 3,969,892 A (STETTLER et al >) 20 July 1976, see entire document	14		
X	US 4,192,139 A (BUCHHEIM) 11 March 1980, see entire document	14		
X	US 4,368,619 A (LEVESQUE) 18 January 1983, see entire document	1,2,6- 8,10,18,19,21,22,24		
X	US 4,897, 995 A ((GUIRGUIS) 06 February 1990, see entire document	1, 2, 8-10, 19-25		
X	US 2,784,551 A (KARLBY et al) 12 March 1957, see entire document	1,2,5,10,19-25		
X,P	US 6,460,343 B1 (RAKHMAILOV) 08 October 2002, see entire document	19,21,22,24		
X	US 5,695,319 A (MATSUMOTO et al) 09 December 1997, see entire document	15,17, 18		
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.				
<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> * Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed </td> <td style="width: 50%; vertical-align: top;"> "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family </td> </tr> </table>			* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family			
Date of the actual completion of the international search 22 March 2004 (22.03.2004)		Date of mailing of the international search report <div style="text-align: center; font-weight: bold; font-size: 1.2em;">31 MAR 2004</div>		
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (703) 305-3230		Authorized officer Justine Yu Telephone No. 308-0858		

BOX II. OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING:

Group I, claims 1-10, drawn to an engine with a rotating assembly including a primary compressor, an inner casing and a compressor-driving nozzle wheel.

Group II, claims 11-13, drawn to an engine with a combustion chamber configured to counteract axial backflow.

Group III, claim (s) 14, drawn to a method of reducing NOx emissions by mixing a combustible mixture including exhaust gas and burning the mixture.

Group IV, claim(s) 15-18, drawn to a method of cooling a blade.

Group V, claim(s) 19-25 drawn to a method of producing torque comprising the directing a vortex through a rotating nozzle.

The inventions listed as Group I-VI do not a single general inventive concept under PCT Rule 13/1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: Group I is distinct from the other groups because it claims the detailed structure of the rotating assembly - which the other groups do not. Group II is distinct from the other groups because it addresses axial backflow in the combustion chamber - which the other groups do not. Also, there is no requirement of a rotating assembly or nozzle. Group III is distinct from the other groups as it deals with a method of reducing NOx emissions by mixing a combustible mixture including exhaust gas and burning the mixture- the other groups do not deal with exhaust gas and the engine could be any type of engine and there are no rotating elements. Group IV is distinct as it deals with cooling the blades- which the other groups do not address. Group V is distinct as it deals with a method of producing torque by providing a vortex of rotating fluid at a first angular velocity through a rotating at a second angular velocity -- which the other groups do not.